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Hydrometeorological Disaster Risk Reduction Mitigation in Johan Pahlawan District, West Aceh District

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Abstract

Disaster Mitigation is a series of efforts to reduce disaster risk reduction, both through physical development as well as awareness and capacity building in dealing with disaster threats. Hydrometeorological disaster is one type of disaster that occurs in Indonesia, especially in Aceh which is affected by changes in weather. Now, La Nina has begun, namely a decrease in sea surface temperature due to changes in world temperature that occur on the surface of the East and Central Pacific Oceans which can form clouds that have the potential to cause rain and there is also an opportunity for Elnino to occur, namely rising sea surface temperatures, due to these weather changes. will cause several other types of disasters such as landslides, strong winds, drought, forest fires. All kinds of disasters that occur cannot be separated from the actions of human hands, as Allah has explained in the Qur'an in the letter Ar-Rum verse 41 which means that damage has appeared on land and at sea caused by the actions of human hands, so that Allah will feel some of them from the consequences of their actions, so that they return to the right path. From this verse, Allah has explained that the damage is the result of human activity, so humans must be aware of their actions. This study took place in the District of Johan Pahlawan, West Aceh Regency. The Johan Pahlawan sub-district was chosen as the research location because the sub-district has 21 villages, most of which are located very close to the sea and most of the villages in this area often experience the threat of hydrometeorological disasters.This study uses a qualitative method using a phenomemological approach, namely based on experiences that occur in an area and literature studies with various relevant fields as well as conducting interviews with people living in villages who often encounter the threat of hydrometeorological disasters. The results showed that all respondents who were used as samples had various levels of knowledge ranging from very low, low and high to knowledge of hydrometeorological disasters.

Keywords
mitigation of disaster risk reduction; hydrometeorological disaster; la nina; elnino; johan pahlawan district

I. Introduction

Johan Pahlawan Subdistrict, which is located in the center of Meulaboh City, is one of the sub-districts in West Aceh Regency which has as many as 21 villages which are located close to the sea, due to frequent erratic weather changes in Johan Pahlawan District, there are several villages whose administrative areas have changed. Becomes the sea and when abrasion occurs during full moon tides, such as Pasir Village, Kampung Behind Village, sea levels often rise which are triggered by waves and strong winds, making the surrounding community have to evacuate to other places far from the shoreline.

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This hydrometeorological disaster occurred due to irregular weather conditions and the increasing number of human activities in various parts of the world that no longer pay attention to the balance of nature and religious teachings, both in development and people's habits in meeting the needs of life. If humans do not maintain the balance of nature, then Allah will warn all humans of a kind of damage as Allah has explained in the Qur'an Surah Ar-Rum verse 41 which means that damage on land and at sea is caused by the actions of human hands, so that Allah feel for them some of the consequences of their actions, so that they return to the right path.Currently, in the District of Johan Pahlawan, preventive efforts have not been carried out by the local government to reduce the danger of hydrometeorological disasters and do not even have a contingency plan to deal with a disaster threat because they are busy with other activities, namely handling the corona virus. Therefore, research on mitigating hydrometeorological disaster reduction can be a common reference for the local government and in making various policies. Hydrometeorological disasters are disasters caused by damage to the hydrological cycle system, so that they also affect climatic conditions on the earth's surface. (Hermon, D. 2012)

II. Review of Literature

Disaster is events or series of events that threaten and disrupt people's lives and livelihoods caused, both by natural factors, non-natural factors and human factors, resulting in human casualties, environmental damage, property losses, and psychological impacts. Disasters like this have happened many times in Indonesia, for example, when the earthquake and tsunami occurred in Aceh, when the tsunami occurred a lot of victims, both victims of life, victims who were injured, victims of property, damage to private and government infrastructure , even today the disaster is still ringing in the ears of the people of Aceh.

Disaster mitigation measures, namely mapping disaster-prone areas, monitoring to anticipate disasters so as to facilitate rescue, dissemination of information, socialization and socialization counseling on all aspects of disasters, and training related to evacuation procedures. (Simamora, R. et al. 2021)

Natural disasters are disasters caused by events or a series of events caused by nature, including earthquakes, tsunamis, volcanic eruptions, floods, droughts, hurricanes, and landslides.Hydrometeorological disasters are disasters caused by changes in weather or climate change, for examplehydrometeorological disasters, namely floods, landslides, droughts, strong winds, tidal waves. (Qodriatun, S. 2013)

Some time ago the Government held a virtual national coordination meeting to discuss the anticipation of hydrometeorological disasters with the theme "Anticipating Hydrometeorological Disasters, Earthquakes and Tsunamis 2020/2021 to Realize Zero Victims". The theme raised is aimed at reducing the number of victims when the disaster occurs.

In the 2020-2024 National Disaster Management Plan, it is explained that the increase in potential impacts and risks of hydrometeorological disasters due to climate change emphasizes increasing the number of critical watersheds (DAS) due to high watershed degradation and sedimentation, where there are several watershed locations in Indonesia that have priority for rehabilitation is carried out for the smooth running of the watershed itself. (Badan Nasional Penanggulangan Bencana, 2020)

Hydrometeorological disasters include disasters with a high risk of occurrence reaching 2,489 events or about 96.8% and the remaining 3.2% are disasters that are not included in hydrometeorological disasters. (Rosyida, A. et al. 2019)

III. Research Methods

3.1. Research Sites

This research was conducted in Johan Pahlawan Subdistrict, West Aceh Regency which is often affected by the threat of hydrometeorological disasters.

3.2. Population and Research Sample

The population used in this study is people who live close to areas that are threatened with hydrometeorological disasters as much as 30 sampling technique, the sampling technique uses saturated sampling, that is, when all members of the population are used as samples.

3.3. Method of collecting data

The data collection method is derived from primary and secondary data sources, primary data is obtained from research instruments in the form of interviews, filling out questionnaires, while secondary data is obtained from literature studies, laws in the field of disaster, journals, and other reports related to reduction disaster risk, especially in the field of hydrometeorological disasters.

IV. Result and Discussion

Johan Pahlawan Subdistrict which is located in the center of Meulaboh City is one of the sub-districts in West Aceh Regency which has as many as 21 villages which are located close to the beach, due to frequent erratic weather changes in Johan Pahlawan Subdistrict, there are several villages whose administrative area has been changed. It turns into the sea and when abrasion occurs during a full moon, such as Pasir Village, Kampung Behind Village, sea levels often rise which are triggered by waves and strong winds, making the surrounding community have to evacuate to other places far from the shoreline. This study uses descriptive qualitative data and research methods using a phenomenological approach that is based on experiences that occur in the community in an area and the study of relevant literature that can support the successful implementation of research from books, journals, laws and from the Qur'an. This research was conducted in Johan Pahlawan Subdistrict, West Aceh Regency, namely in several villages such as Ujung Kalak Village, Pasar Baru Village, Leuhan Village, Pasir Village, Kampung Behind Village because in one of the selected villages it is located very close to the beach and is also a one of the villages with a very large population and office buildings and shops because it is located in the center of Meulaboh city, the village is Ujung Kalak. (Sabir, A. 2012)

When this research was conducted in the Johan Pahlawan District, the researchers had not seen and found any preventive efforts that had been carried out by the local government to reduce the danger of hydrometeorological disasters and even according to reliable sources they also did not have contingency plans to deal with a disaster threat because they were busy with activities. Another is the handling of the corona virus.Therefore, research on mitigating hydrometeorological disaster risk reduction is expected to become a future program as a common reference in knowledge-based disaster risk reduction from previous disasters that have occurred in Aceh and for the time being it is hoped that the local government will take part in making improvements. to ditches and drainages that are clogged with garbage even though it has not been programmed by the relevant agencies and to accelerate the construction of retention ponds to accommodate the overflowing water discharge every time it rains.

In the Qur'an, Surah Ar-Rum verse 41 which means:it has been seen that damage on land and at sea is caused by the actions of human hands, so that Allah will feel for them some of the consequences of their actions, so that they return to the right path, the verse gives us an illustration that we must be able to maintain the balance of nature so as not to cause havoc or disaster to its inhabitants, even in other suras such as Albaqarah 2:11, Al A'raf 7:56, Al Anbiya 21:22 Allah has also explained the problem of natural damage, but if humans believe and do not destroy nature, then Allah will also explained that if the inhabitants of the lands had believed and were pious, we would surely have bestowed upon them blessings from the heavens and the earth, but they denied Our signs, then We will punish them for their deeds.

The number of samples used is 30 samples because the population is part of the number and characteristics possessed by the population and must really be a representative part of the sample [9]. If the study uses a sample of less than 100 samples, the number of samples may be taken as a whole from the population or sample, but if the sample exceeds 100 then 15% - 25% of the total population may be taken(Arikunto and Suharsimi, 2012)

To members of the population who were used as samples, the researcher provided several questions related to hydrometeorology when carrying out a question and answer discussion group, in the discussion there were many questions related to the research topic and especially many suggested to the government that the government could work in overcoming the flood effects of continuous rain.

Research respondents as many as 30 samples gave varied answers to the questions posed in the study, and after the researchers analyzed the research data, it can be concluded that the level of public knowledge of disaster risk mitigation programs against hydrometeorological threats or disasters in general is still in a low state so it is important to provide education to the community more broadly and longer so that the public can understand and know the steps to be achieved in order to reduce the risk of hydrometeorological disasters, while the points of research questions and the level of absorption of answers from the community are very varied and can be seen as follows:

1. Do you know what hydrometeorology is? if not what is the answer, and if know what the answer is.
2. The first question above which answered very low consisted of 8 samples or 26.7%, then answered low also consisted of 8 samples or 26.7% and the rest with high answers were 14 samples or 46.7%.
3. Do you know that hydrometeorology is categorized as a type of disaster, please give your opinion.
4. The second question above that answered very low consisted of 15 samples or 50%, answered low 7 samples or 23.3% and answered high as many as 8 samples or 26.7%.
5. Try to give your opinion what is the meaning of a hydrometeorological disaster.
6. The third question above answered very low by 2 samples or 6.7%, answered with a low of 9 samples or 30% and answered with a high of 19 samples or 63.3%.
7. 4. What steps should the local government take to prevent (mitigate) hydrometeorological disasters.

8. The fourth question above which answered very low was none, then answered with a low of 12 samples or 40% and answered with a high of 18 samples or 60%.
9. 5. Is environmental damage classified as a hydrometeorological disaster.
10. The fifth question above which answered very low and with low no and answered with a high of 30 samples or 63.3%.
11. Why does it often rain in Aceh?
12. The sixth question above which answered very low consisted of 2 samples or 6.7%, answered low 22 samples or 73.3% and answered high as many as 6 samples or 20%.
13. What are the causes of frequent rains in Aceh.
14. The seventh question above which answered very low consisted of 3 samples or 10%, answered low 25 samples or 83.3% and answered high as much as 2 samples or 6.7%.
15. Besides raining in Aceh, drought also often occurs, why is that so please provide your short answer.
16. The eighth question above that answered very low consisted of 1 sample or 3.3%, answered low 27 samples or 90% and answered high as much as 2 samples or 6.7%.
17. Have you ever heard of La Nina and Elnino, if not, please give your answer, and if you have, please give your answer and tell a short story.
18. The ninth question above which answered very low consisted of 28 samples or 93.3%, answered with low 2 samples or 6.7% and answered high no.
19. Aceh often changes seasons, sometimes from hot to rainy, sometimes vice versa, well sometimes it rains but how come it feels hot, surely you have felt it, that's one example of the influence of hydrometeorology.

The tenth question above with very low answers consisted of 10 samples or 33.3%, low answers 19 samples or 63.3% and high answers with 1 sample or 3.3%.

4.1. Characteristics of Respondents

The following are the characteristics of respondents based on knowledge, gender, age and occupation.

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	17	56,7	56,7	56,7
	Female	13	43,3	43,3	100,0
	Total	30	100,0	100,0	

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	17-25 year old	2	6,7	6,7	6,7
	26-35 years old	8	26,7	26,7	33,3
	36-45 years old	19	63,3	63,3	96,7
	46-55 years old	1	3,3	3,3	100,0
	Total	30	100,0	100,0	

Profession

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Midwife	2	6,7	6,7	6,7
	House wife	4	13,3	13,3	20,0
	Student	2	6,7	6,7	26,7
	Fisherman	2	6,7	6,7	33,3
	Trader	2	6,7	6,7	40,0
	Private	16	53,3	53,3	93,3
	Soldier	1	3,3	3,3	96,7
	Entrepreneur	1	3,3	3,3	100,0
	Total	30	100,0	100,0	

	Very low		Low		Tall		Total	
	Count	%	Count	%	Count	%	Count	%
1. Do you know what hydrometeorology is? if not what is the answer, and if know what is the answer	8	26.7%	8	26.7%	14	46.7%	30	100.0%
2. Do you know that hydrometeorology is categorized as a type of disaster, please give your opinion	15	50.0%	7	23.3%	8	26.7%	30	100.0%
3. Please give your opinion what is the meaning of a hydrometeorological disaster	2	6.7%	9	30.0%	19	63.3%	30	100.0%
4. What steps should the local government take to prevent (mitigate) hydrometeorological disasters	0	,0%	12	40.0%	18	60.0%	30	100.0%
5. Is environmental damage considered a hydrometeorological disaster	0	,0%	0	,0%	30	100.0%	30	100.0%
6. Why does it always rain in Aceh	2	6.7%	22	73.3%	6	20.0%	30	100.0%
7. What are the causes of frequent rains in Aceh	3	10.0%	25	83.3%	2	6.7%	30	100.0%
8. Apart from raining in Aceh, drought also often occurs, why is that, please provide your short answer	1	3.3%	27	90.0%	2	6.7%	30	100.0%
9. Have you ever heard of La Nina and Elnino, if not, please give your answer, and if you have, give your answer and tell me a short story.	28	93.3%	2	6.7%	0	,0%	30	100.0%
10. Aceh often changes seasons, sometimes from hot	3	10.0%	3	10.0%	24	80.0%	30	100.0%

to rainy, sometimes vice versa, well sometimes it rains but how come it feels hot, surely you have felt it, that's one example of the influence of hydrometeorology.								
Knowledge of Hydrometeorological Disaster Mitigation	10	33.3%	19	63.3%	1	3.3%	30	100.0%

Gender * knowledge of hydrometeorological disaster mitigation crosstabulation

			Disaster Mitigation Knowledge Hidrometeorologi			
			Very low	Low	Very low	Total
Gender	Male	Count	6	10	1	17
		% within Gender	35,3%	58,8%	5,9%	100,0%
		% within Knowledge Disaster mitigation Hidrometeorologi	60,0%	52,6%	100,0%	56,7%
	Female	Count	4	9	0	13
		% within Gender	30,8%	69,2%	,0%	100,0%
		% within Knowledge Disaster mitigation Hidrometeorologi	40,0%	47,4%	,0%	43,3%
Total		Count	10	19	1	30
		% within Gender	33,3%	63,3%	3,3%	100,0%
		% within Knowledge Disaster mitigation Hidrometeorologi	100,0%	100,0%	100,0%	100,0%

Age * Knowledge of Hydrometeorological Disaster Mitigation Crosstabulation

			Disaster Mitigation Knowledge Hidrometeorologi			
			Very lo	Low	High	Total
Age	17-25 year	Count	0	2	0	2
		% within age	,0%	100,0%	,0%	100,0%
		% within knowledge Disaster mitigation Hidrometeorologi	,0%	10,5%	,0%	6,7%
	26-35 tahun	Count	2	6	0	8
		% within Age	25,0%	75,0%	,0%	100,0%
		% within Knowledge Disaster mitigation Hidrometeorologi	20,0%	31,6%	,0%	26,7%
	36-45 tahun	Count	8	10	1	19
		% within Age	42,1%	52,6%	5,3%	100,0%
		% within Knowledge Disaster mitigation Hidrometeorologi	80,0%	52,6%	100,0%	63,3%
	46-55 tahun	Count	0	1	0	1
		% within Age	,0%	100,0%	,0%	100,0%
		% within Knowledge Disaster mitigation Hidrometeorologi	,0%	5,3%	,0%	3,3%
Total		Count	10	19	1	30
		% within Age	33,3%	63,3%	3,3%	100,0%
		% within Knowledge Disaster mitigation Hidrometeorologi	100,0%	100,0%	100,0%	100,0%

Occupation * knowledge of hydrometeorological disaster mitigation crosstabulation

			Pengetahuan Mitigasi Bencana Hidrometeorologi			
			Sangat Rendah	Rendah	Tinggi	Total
Work	Midwife	Count	0	2	0	2
		% within Jobs	,0%	100,0%	,0%	100,0%
		% within Knowledge Disaster mitigati Hidrometeorologi	,0%	10,5%	,0%	6,7%
	House wife	Count	2	2	0	4
		% within Jobs	50,0%	50,0%	,0%	100,0%
		% within Knowledge Disaster mitigati Hidrometeorologi	20,0%	10,5%	,0%	13,3%
	Mahasiswa	Count	0	2	0	2
		% within Jobs	,0%	100,0%	,0%	100,0%
		% within Knowledge Disaster mitigati Hidrometeorologi	,0%	10,5%	,0%	6,7%
	Nelayan	Count	2	0	0	2
		% within Jobs	100,0%	,0%	,0%	100,0%
		% within Knowledge Disaster mitigati Hidrometeorologi	20,0%	,0%	,0%	6,7%
	Pedagang	Count	0	1	1	2
		% within Jobs	,0%	50,0%	50,0%	100,0%
		% within Knowledge Disaster mitigati Hidrometeorologi	,0%	5,3%	100,0%	6,7%
	Swasta	Count	6	10	0	16
		% within Jobs	37,5%	62,5%	,0%	100,0%
		% within Knowledge Disaster mitigati Hidrometeorologi	60,0%	52,6%	,0%	53,3%
	TNI	Count	0	1	0	1
		% within Jobs	,0%	100,0%	,0%	100,0%
		% within Knowledge Disaster mitigati Hidrometeorologi	,0%	5,3%	,0%	3,3%
	Wiraswasta	Count	0	1	0	1
		% within Jobs	,0%	100,0%	,0%	100,0%
		% within Knowledge Disaster mitigati Hidrometeorologi	,0%	5,3%	,0%	3,3%
Total		Count	10	19	1	30
		% within Jobs	33,3%	63,3%	3,3%	100,0%
		% within Knowledge Disaster mitigati Hidrometeorologi	100,0%	100,0%	100,0%	100,0%

The most dominant hydrometeorological disasters felt by the people in Johan Pahlawan Subdistrict were the continuous rain that often made their area flooded, while drought and other disasters were very rare because according to data from the Meteorology, Climatology and Geophysics Agency (BMKG) the western region of Aceh was indeed It is an area where it rains all year round. The following is a picture of a road that is flooded due to prolonged rain in Leuhan Village, Johan Pahlawan District, West Aceh Regency which was conveyed by the local village head reaching more than 1 meter, the water came from the overflow of Krueng Meureubo due to the high intensity of rain that flushed the area .

Figure 1*. Floods in Leuhan Village, Johan Pahlawan District*

The sewer in the Johan Pahlawan sub-district is only found in one place where the water discharge to the sea is located in Pasar Baru Village, and it has become a very busy sewer because of the large amount of water that is finally unable to accommodate the amount of water that is needed. there are so many, here is a picture of the floodgate in Pasar Baru village, Johan Pahlawan District.

Figure 2*. New Market Village Water Gate*

But the improvement process from the local government according to the results of observations in the field also does not exist. The following is a photo of Lueng Aye's condition from behind the car terminal to the business development market which is littered with garbage.

***Figure 3**. Lueng Aye's Condition at the Meulaboh Business Development Market When It's Not Raining*

***Figure 4**. Lueng Aye's Condition behind the Car Terminal When It's Not Raining*

Figure 5*. Lueng Aye's condition beside the Meulaboh chicken and meat market when it's not raining*

According to data obtained from the BMKG, the level of rainfall that occurs in the western region of Aceh is quite high when compared to other Aceh regions such as Banda Aceh for the number of days without rain can be up to 17 days without rain then followed by Peusangan District in Bireuen for 14 days never it rains, but in the western region of Aceh it rains very often within one week, for example in one week it will rain up to several times with a low to moderate scale, this is what often makes the Johan Pahlawan sub-district area often flooded with good water on roads and roads. roads and in drainages, because the inundated water cannot go to the final disposal site into the sea. The following is an image obtained from BMKG regarding the number of days without rain. (Badan Meteorologi Klimatologi dan Geofisika Aceh Besar, 2021)

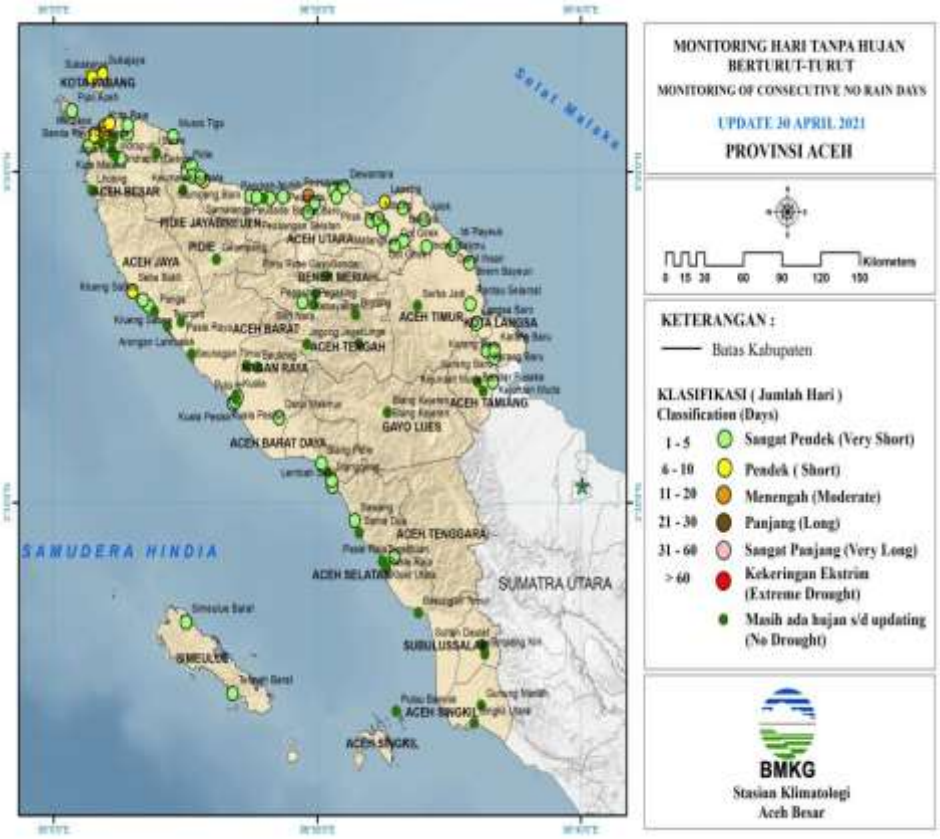

Figure 6. *Monitoring of Rainless Days by BMKG*

The solution for handling hydrometeorological disaster mitigation which should be the main thing to be followed up by the local government is still far from expectations because according to interviewees it explained that the local government does not yet have a program and agenda to deal with this problem because they are busy in dealing with the COVID-19 pandemic which is still ongoing. is often a major problem in society.

Last year, the West Aceh District Government through the Public Works and Public Housing (PUPR) service had a discourse on the construction of a retention pond to deal with flooding that can accommodate as much as 3600 cubic meters (M3) of water discharge as a reservoir other than drainage channels, while the primary channel owned by the local government often buried by sea sand known as the asylum which is located on the beachfront of the village of Kuta Padang and every few months it is always cleaned for smooth drainage of water, the asylum is the only one in Johan Pahlawan District which is unable to work optimally when it rains constantly dropping,then the blockage of the Lueng Aye drainage which is behind the inter-city inter-provincial car terminal adds to a series of piling up a lot of water and added to the accumulation of garbage on it to the direction of the Padang Seurahet river bridge where fishermen unload their catches of marine fish, the following is an illustration of the pond retention to cope with flooding which is planned to be built in Aceh Barat but has not yet been built due to the high cost and other reasons.[12]the following is an illustration of a retention pond to cope with flooding that is planned to be built in Aceh Barat but has not yet been built because it requires very expensive costs and other reasons.[12]the following is an illustration of a retention pond to cope with flooding which is planned to be built in Aceh Barat but has not yet been built because it requires very expensive costs and other reasons.(Fakri, D. 2020)

***Figure 7**. Retention Pool Illustration*

V. Conclusion

Conclusions and suggestions that can be concluded in this study are as follows:

1. The threat of Hydrometeorological Disasters can occur at any time because Johan Pahlawan District, West Aceh Regency is very frequent with long duration rains
2. The location of Johan Pahlawan Subdistrict is very close to the shoreline so that many people's houses are submerged by water when abrasion and rain fall
3. The West Aceh District Government should have planned a program to deal with the threat of hydrometeorological disasters
4. The Government of Aceh Barat Regency should repair water drainage channels in the form of ditches, drainage so that any water that passes through these facilities can immediately go to the final disposal site into the sea.

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